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ORIGINAL ARTICLES.

ON A CASE OF PARTLY PIGMENTED SPINDLE CELL SARCOMA OF THE IRIS: PROLIFERATING CHOROIDITIS AND MICROSCOPICAL HOLE IN THE FOVEA CENTRALIS.

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On March 10th, Mrs. A. C. A., 49 years old, came to consult me on account of pain and loss of vision in the right eye. She and her husband stated that they had for a number of years noticed a spot in the iris, but paid no particular attention to it. Of late the patient had noticed a falling off in vision and had had attacks of pain, especially at her menstrual period. The attack of pain from which she suffered when calling on me had come on about three weeks previously.

At this time V. in the affected eye was 20/70? The eye was perfectly quiet; there was especially no episcleral injection. The anterior chamber appeared quite shallow in its lower third; the pupil was small and not moveable downwards. The shallowness of the lower third of the anterior chamber was due to a protrusion in the iris. This protrusion had a triangular shape, base downward and reached to the pupillary edge which did not seem to rest on the anterior lens capsule as in the norm. There was only a slight difference in color between the visibly raised part

and the remainder of the grey iris, in that it was slightly darker. There was another small, darker grey, slightly raised spot visible at the outer upper quadrant of the iris and close to the periphery. Tension was slightly increased. The ophthalmoscope showed a slight excavation of the disc and some haziness around it.

After a few instillations of atropine the upper half of the iris was contracted slightly, increasing the size of the pupil somewhat. Where the protrusion was situated in the lower third of the iris the pupillary edge withdrew from the lens sufficiently to make visible several grey-black nodular elevations on the posterior surface of the iris.

I came to the conclusion that I had to deal with a sarcoma of the iris, and thus informed the patient and her husband, urging immediate enucleation in spite of the comparatively good vision. They agreed to it and on March 11th I enucleated the eye with general narcosis.

The healing was prompt and uneventful, and the patient has been wearing an artificial eye since April and thus far has no further complaints to make.

The eye was put into formol solution and then in alcohol. When sufficiently hardened I cut it in two æquatorially. The posterior half, besides showing a slight excavation of the disc and a fovea centralis which appeared larger than usual, showed as another point of interest a slightly elevated and partly pigmented spot near the æquator to which the vitreous body was adherent. It had been impossible to see this spot with the ophthalmoscope. Having cut the anterior half in two meridionally, I was astonished to find that the growth in the iris was not confined to the two protruding portions of the iris which had been plainly visible clinically, but that the whole periphery of the iris was thickened, in a manner as has been described as ring sarcoma of the iris (cf. L. Werner, *Transactions of the Ophthalmological Society, of the United Kingdom*, Vol. XXV., p. 266). This thickening of the iris periphery was not uniform, but was most pronounced in the lower third where it had been so plainly visible clinically. Here the tumor really started at the ciliary body and reached forward to the pupillary edge (see Fig. 1) and slightly protruded over it.

Microscopical sections through this part showed that the iris had been adherent to Descemet's membrane and that there had been in reality no anterior chamber at all left in the lower part. The dehiscence seen in Figure 1 is artificially produced. An-



FIG. 1.

other peculiar point is that the tumor near the periphery is seen to be lying behind the considerably altered iris, separated from it for almost half the width of the iris by the pigmented epithelial layer. Nearer the pupillary edge the newformation enters and really replaces the iris tissue proper. But, even in the half in which the main tumor lies back of the pigment layer of the iris, the anterior surface of this membrane is, also, made up of tumor tissue. This is the appearance where the tumor has attained its greatest thickness and largest size. In other sections the tumor occupies sometimes more (see Fig. 2), sometimes less, and in

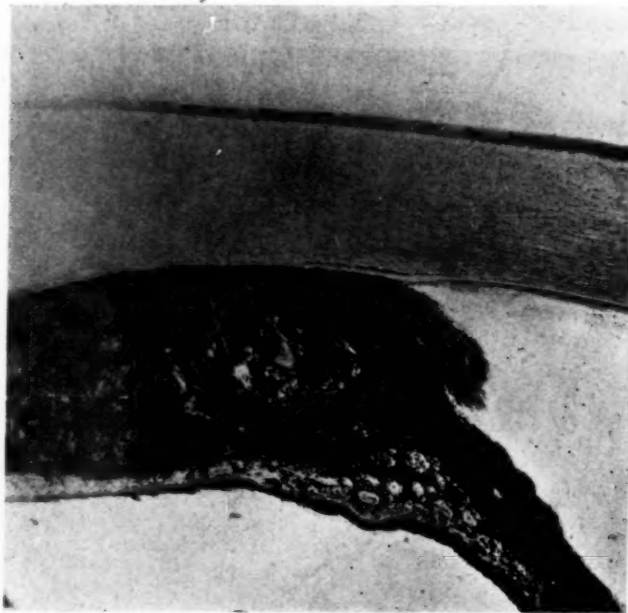


FIG. 2.

one part only the most peripheral part of the iris. Here and there separate microscopic tumor nodules are found on the surface of parts of the iris which are otherwise not very much affected and which had clinically shown nothing peculiar.

Where the tumor is thickest on the posterior surface of the iris it is most deeply pigmented. The parts lying in the iris tissue and on its anterior surface are free from pigment.

In bleached sections it is shown that the elements of which the tumor is made up are spindle cells, those which carry pigment as well as those that are unpigmented. (See Figure 3.)

The tumor contains in parts numerous bloodvessels and blood spaces.

In some sections the tumor cells reach so far back into the anterior portion of the atrophied ciliary body that it looks as if the tumor was growing, not only toward the pupillary edge of the iris, but also peripherally into the ciliary body. In fact, in some sections it appeared, as if, perhaps, the crigin of the tumor was to be sought in the anterior part of the ciliary body and not in the iris, but it was impossible to come to a definite conclusion.

At the location of the ligamentum pectinatum and Schlemm's canal the tumor elements have entered the sclerotic. (See Fig. 1.) Possibly, if allowed to grow further, the tumor might have ruptured the eyeball here.



FIG. 3.

Where the tumor lies back of the iris in bleached sections the cells of the pigment layer and of the dilatator pupillæ are still visible and can be traced forward almost to the pupillary third of the width of the iris. This fact, again makes it appear, as if the tumor having originated in the iris tissue near the pupillary margin had broken through into the posterior chamber and there grown further, lying in contact with the pigment layer of the posterior surface of the iris which it had not destroyed when the eye was enucleated.

Interesting as is the point of origin of this tumor and, although I have studied it most thoroughly, it has been impossible to find sections which would still warrant a conclusion. Certainly the topography of this iris tumor differs very materially from that of all iris tumors previously examined by me.

The macroscopical appearance of the elevated spot in the choroid made me suspect a metastasis. The microscopical sections showed, however, a structure so different, that this spot must be considered as the result of an inflammatory process. (See Figures 4 and 5.) The tumor-like elevation has its base in the choroid from where it has broken through the retina and grown to some extent into the vitreous body, into which it sends a long thread-like process which returns to the retina farther forward towards the ora serrata.

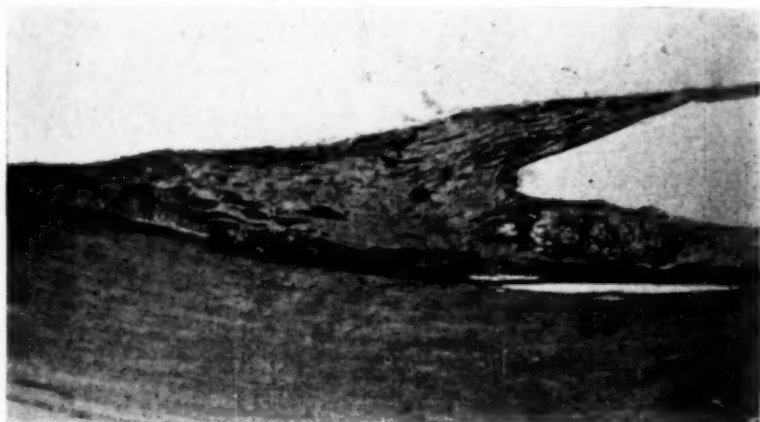


FIG. 4.

In the periphery of this elevation the choroid is hyperæmic. The base of the tumor and its whole tissue is made up of dense structureless connective tissue, in which very few nuclei are visible. It appears as if layer after layer had been deposited, and between the layers are numerous parts which are very dark, almost black. In bleached sections all of these dark parts are seen to be made up of pigment epithelial cells. The thread-like process also consists of such modified connective tissue and bears on its outer surface (towards the retina) a single layer of pigment epithelial cells.

Close to this tumor the retina is considerably altered and swollen and nodules formed of pigment epithelial cells (not colloid bodies) project into it.

I think we may with propriety call this a case of proliferating choroiditis, as we speak of proliferating retinitis. It is, however, impossible to say whether the origin of this choroidal growth was a hæmorrhage, as it seems accepted for the proliferating retinitis.

Perhaps, it may, also, be a congenital malformation, although I do not remember ever having seen anything similar. At any rate this peculiar formation does not seem to have any direct connection with the iris tumor.

Sections through the fovea centralis which macroscopically appeared larger than usual, show also a peculiar condition of this part of the retina. While the cellular layers of the retina surrounding this fovea do not seem to be particularly altered, in

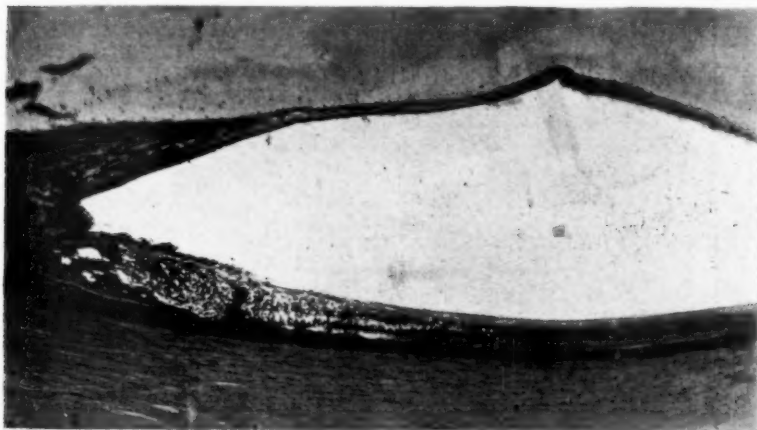


FIG. 5.

the fovea itself the cones are no longer visible as individual structures, but form a confluent mass in which only here and there a few parallel lines remind one of their outer segments. The tissue of the fovea itself consists simply of a few fibres with a half dozen nuclei and one single ganglion cell, which can be recognized as such. In two sections this thin membrane shows a microscopical rupture. In all of the sections the distance between the walls of the fovea is greater than in the norm. (See Figure 6.)

There can be no doubt but that a stretching of the tissues has occurred here with the consequent destruction of the fibrous and cellular elements. Whether this was an cedema, it is not possible to know. However, there is, if only microscopically, a hole

in the fovea. The appearance differs from the hole in the macula which I had occasion to describe in Volume XXV., p. 225 of this Journal, and from the one which Fuchs since described in Volume LXXIX., No. 1 of von Graefe's *Archives*. Since in Fuchs' case "the whole area of the hole is filled with a thin membrane," it seems strange that it should be spoken of as a hole in the fovea. Yet Fuchs states that this thin membrane is "not a continuation of the retina, but is sharply distinct from it, since it appears as if glued to the edge of the retina." In the case, here described, there is no newly formed tissue filling a hole in the fovea; the tissue of the fovea is simply reduced to an extremely thin, stretched membrane in perfect continuity with

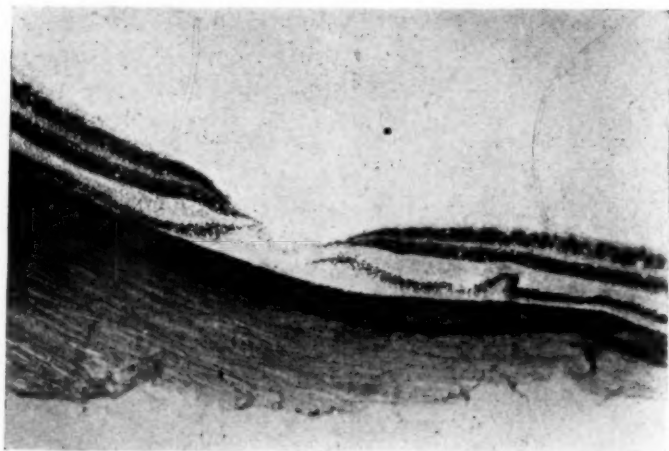


FIG. 6.

the surrounding retina, and in this there is a microscopical hole, a hole which the ophthalmoscope could not have detected on account of its diminutiveness.

Whether the occurrence of this alteration in the fovea centralis stands in any causal relationship with the proliferating choroiditis it seems impossible to say. Yet this is not likely since the affection of the fovea is evidently of a more recent date.

The changes in the optic nerve are characteristic of glaucoma, but not very far developed. The haze which was seen with the ophthalmoscope around the excavated optic papilla is explained by a thin layer of newly formed connective tissue which starts in the cup and reaches over its edges for a little distance.

THE ACTION OF ESERINE ON THE EYE.

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The following remarkable case has come under notice, and furnishes a small piece of such definite evidence, that it is worth recording:

A man, then aged 35, was seen thirteen years ago, suffering from absolute glaucoma in one eye, and threatened in the other. The blind eye was excised on account of pain, and the other eye was watched for some time. The attacks of glaucoma so far as clinical appearance went were almost entirely prodromal. There was slight rise of tension, accompanied with haziness of the cornea, which disappeared in a few minutes under the influence of eserine. Ultimately, an upper iridectomy was performed to relieve these symptoms. The iris frayed during the operation. The operation was, however, completely successful, and from that time until November, 1910, the patient had no further trouble. He returned, however, in November, 1910, suffering from glaucoma in his only eye. The vision with +5 D = 6/9. There are marked cupping of the disc, and marked venous pulsation. The field was materially contracted in somewhat concentric fashion. The tension as determined by the tonometer was 60 mm. of mercury. A lower iridectomy was at once performed, so that the effect of the two operations has been to produce a very large coloboma, extending widely from the upper to the lower limbus, and to leave only a small piece of iris visible on each side of this double coloboma.

The effect of the operation for the time seemed to be excellent. The tension fell, and the trouble seemed over. Unfortunately, glaucoma set in again some weeks after operation, and the tension rose materially, but was always relieved by the use of eserine. The interesting feature, however, is that the use of eserine causes no apparent alteration in the size of the pupil, or in the diameter of the pieces of iris, but it speedily lowers ten-

sion. It has been tested repeatedly by discontinuing the eserine, estimating tension, applying eserine, and testing it again. The tension falls within an hour. Repeated measurements have been made, and the tension, which has risen to 33, 35, or 37 mm. falls rapidly to 23 or 25 mm. Concurrently with the relief of the glaucoma, the field has assumed fairly normal proportions, and the vision now with +4, 5D \subset +1, 75D c 170°=6/6.

After using eserine for some considerable time, it was discontinued, and for many days past the tension has remained down, varying from 25 to 30 mm.

In view of these facts, it is difficult to understand that eserine acts by producing contraction of the iris and the opening of the spaces of Fontana, for by no examination, however minute, can the slightest trace of movement in the edges of the cut iris be detected.

Dr. M. Lynch has kindly taken the foregoing measurements and notes.—*Australian Medical Journal*.

A CASE OF SO-CALLED BOTTLE-MAKER'S CATARACT.

Robert von Der Heydt (*Jr. A. M. A.*, March 18, 1911) reports a case of typical so-called bottle-maker's cataract occurring in a man 41 years of age who has been working steadily as a baker during the past twenty-four years, thus being subjected daily to continued high temperatures. Most German writers agree that continued heat is the factor which causes this type of cataract which is different from other forms. The author quotes Herbert Parsons and Marcus Gunn as saying: "Bottle-maker's are subject to a form of cataract which appears to be characteristic, and is unlike other forms of cataract commonly observed. In its typical form there is a dense, well-defined disk of opacity in the center of the posterior cortex. Not infrequently slighter hazy opacities are seen around this posterior cortical disk." His case corresponds with this description and is of interest because of the man's occupation.

TRANSLATIONS.

OPACITY OF THE LENS AFTER CAUTERIZATION WITH HYDROCHLORIC ACID.*

BY DR. FEHR.

(Translated by A. Alt, M.D.)

Guillery† when studying cauterization of the rabbits' cornea, found that when anorganic acids, especially hydrochloric, sulphuric, or nitric acid, are brought on the cornea in a slightly diluted or pure condition, an opacity of the lens results. Acetic acid did not do this, neither caustic lime or potash. Guillery assumes that this opacity of the lens is an effect peculiar to these mineral acids. It may be fully developed in a few hours after the cauterization. The damage produced concerns the capsule as well as the lens substance. The changes found in the capsular epithelium were such as are observed also after other deleterious influences on the lens, for instance, ultra-violet light, and in typical senile cataract. The epithelia are wanting in places, the cells appear as if glued together, the nuclei are swollen and pale or shrunken, many vacuoles are found in the nuclei and the protoplasm. These changes are seen more particularly in an area corresponding to the pupil, which is surrounded wall-like by a narrow thickened epithelial ring the cells of which take on a deep stain. The anterior cortical part of the lens substance shows the greatest alteration. There are small vacuoles in the lens fibres and places of perfect desintegration into a white gruel-like mass, which microscopically consists of globules and droplets which no longer permit of recognizing any lens structure. The peripheral parts of the lens, thanks to the iris, are little altered, yet these changes may spread around the æquator into the posterior cortex. Even the æquator is hardly ever found to be normal.

The fact that with relatively frequent cauterizations with acids of the eye in man such opacities of the lens have hardly ever been observed, is explained by Guillery by the immediate attrac-

*Centralbl. fuer Augenhlk., April, 1911.

†Archiv. f. Augenhlk., 1909, Vol. LXIII., p. 258.

tion of the attention after such an accident to the burnt parts and by the corneal opacity rendering the inspection of the lens impossible. I found but two cases in literature in which a lens opacity had been seen after such a cauterization. The first, mentioned by Guillery, too, was presented by Tertsch* in 1908 to the Vienna Ophthalmological Society. The patient, 35 years of age, had been literally covered with sulphuric acid. He came to the clinic a week later. Aside from burns on the nose, cheeks and eyelids, the conjunctiva of both lower lids was found to be white and necrosed, partly, also that of the upper lids. On the right side the ocular conjunctiva was, also, necrosed and the cornea looked dull and was slightly and diffusely opaque. Iritis with hypopyon. After dilatation of the pupil a uniformly gray cataract became visible. $V=1/\infty$ with good projection. The left bulbar conjunctiva was necrosed in parts only, the outer half of the cornea showed a dull, diffuse, superficial opacity. Iritis with hypopyon here, too. An exudation lying in the pupil made it impossible to see whether or not there was a cataract. On the right there was a total, on the left a partial symblepharon. While the symptoms gradually receded in the left eye and a corneal scar was formed, an ulcer formed at the right lower corneal margin which soon perforated and led to complete necrosis of the cornea with prolapse of the iris and lens. Tertsch did not venture to decide whether the formation of the cataract was the result of the iritis or of the chemical action of the sulphuric acid. He thought the former the more probable explanation.

The publication of the second case by Schmidt† was prompted by Guillery's paper. While a coppersmith was cleaning some utensils some hydrochloric acid, no longer concentrated, splashed into his eye. The eye was at once thoroughly washed out at a nearby faucet. A quarter of an hour later the patient was in the hands of the oculist who cocainized the eye and again thoroughly washed the conjunctival sac. The painful irritation passed off rapidly and after the healing of a small erosion the cornea was clear. The only visible result of the injury was the development of a small scar with three radiations in the conjunctiva of the left upper lid. When a week after the injury the patient was discharged numerous minute round opacities, the largest with a diameter about half a millimeter, were found in the cortex. They showed no definite arrangement, but were

*Wien. ophth. Gesellsch., May 18, 1908. Ref. in the Centrbl., 1908, p. 332.

†H. Schmidt, Zeitsch. f. Augenhk., XXIII., p. 241.

pretty uniformly distributed over the whole cortex. After dilatation of the pupil at the æquator some of them were seen to coalesce so as to assume a more oblong shape; most of them were situated in the exterior cortical layer. V. at first equalled 0.7; later on the opacities seemed to be increased in size and V. fell to 0.5. The right eye was perfectly normal. The author is of the opinion that most probably a causal connexion exists between the burn with the acid and the opacities of the lens. Aside from Guillery's proof of the possibility of such a connection, the fact that the opacities of the lens were found in the injured eye only which, when previously examined for some other reason, had always been free from such opacities, speaks for such an assumption.

The ætiological connection between lens opacity and cauterization with hydrochloric acid is above doubt in a case which came to the eye clinic of the Rudolph Virchow Hospital during the last year. The injured man, a saddler, was the object of a crime; the malefactor his divorced wife. To revenge herself because he did not keep his promise to remarry her, the furious woman poured crude hydrochloric acid, which in order to be able to hit more correctly she had put into a milk pot, over the face and both eyes of the man while he lay in bed. Almost crazed by fear and pain the blinded man ran from room to room and several hours had passed before some of his neighbors took charge of him and brought him to the nearest hospital. There the eyes were very thoroughly washed and the following noon, April 4th, 1910, he was transferred to our clinic. We saw him 20 hours after the cauterization.

The whole face showed burns of the first to the third degree. The œdematous lids were spasmodically closed and could be opened by force only. The lid margins were whitish-gray; the conjunctiva of the upper as well as of the lower lids was changed into a gray-white membrane; necrotic shreds were hanging from it. The ocular conjunctiva was chemotic, softened and swollen, studded with punctiform hæmorrhages and of a more yellow-white color. Compared with the conjunctiva the cornea was less affected. There was on both sides a diffuse opacity of the tissue proper, more on the left than on the right, and necrosis of the defective epithelium, but the transparency was still sufficiently preserved that iris and pupil could be easily seen. The pupillary reaction was vivid. Both lenses were densely opaque. Cornea and conjunctiva were perfectly anæsthetic; the motility of the eyeballs was intact.

The right eye could count fingers at 20 ctm., the left one at 10 ctm.

Treatment consisted in repeatedly washing out the conjunctival sacs, atropin and cocain salve applied to the conjunctival sac and salve bandages on the face.

During the following days the palpebral as well as the ocular conjunctiva sloughed off in increasingly large pieces, finally perfect membranes had to be removed by means of forceps and scissors. It was noticed that during this time the cornea cleared up rapidly, not by means of sloughing off of the necrosed epithelium, but by the clearing of the substance proper. The absolutely bad prognosis which had been made at first, seemed to become better and we began to have slight hopes to be able to preserve the eyes. Unfortunately this lasted but a short time. For already on April 11th, that is just 8 days after the injury, quite suddenly the first ominous signs of disturbed nutrition and necrosis of the eyeballs made their appearance. The eyes became soft, a deep, diffuse yellowish infiltration formed at the corneal margin and quickly spread over the whole cornea. The left one soon perforated, lens and vitreous body prolapsed and the eyeball suppurated. The right cornea became thinner and thinner till it looked as if the iris was lying free, and the eyeball became wrinkled as in a corpse. On April 25th both eyes were already completely shrunken. At the same time the conjunctival sacs shrank and a broad union between the lids and eyeballs and between the lids themselves took place. In the middle of May there was total symblepharon and total ankyloblepharon on both sides and the patient had to be removed to a charitable institution.

Our case is very similar to the one of Tertsch. These two cases, much more than the one of Schmidt, repeat Guillery's experiments in reality on account of the energetic cauterization. As regards the ætiology of the cataract ours is the more valuable, since it was formed already within a few hours of the cauterization and there can therefore be no doubt as to the damage to the lens being directly due to the action of the acid. Undoubtedly Tertsch's case must be explained in the same manner, and this has been done by Guillery. Acquainted with our case this author would now probably share the same opinion. Our case supports, also, Schmidt's explanation of his case, which is not as convincing on account of the comparatively slight damage to the lens, so that it is impossible to exclude an accidental coin-

cidence. Our case furnishes the proof that, as was to be expected, Guillery's experiments made on rabbits hold good in man, too. It is strange that, as in Guillery's experiments, in our case the lens was damaged by the acid much more seriously than the cornea, although the former was reached by a much less concentrated acid, than the latter. The cornea was still transparent when the lens was completely opaque. It even seemed for a few days as if the cornea would recover from the cauterization, and it cleared up to a certain degree. Guillery observed similar facts. Quite suddenly on the eighth day after the injury in our case the sloughing of the cornea came on; it seems as if it had been due less to the direct damage to the cornea itself than to the cauterization of the conjunctiva and sclera and the nutrient vessels. Our case differs from Guillery's since the acid did not only burn the cornea, but the whole anterior part of the eyeball. We may assume that the hydrochloric acid which is rated as the most diffusible one of the anorganic acids, does not only penetrate through the cornea into the anterior chamber, but even into the vitreous body through the sclerotic, and thus the lens is not attacked from the front only, but from all sides.

ON IDIOPATHIC CILIARY NEURALGIA.*

By DR. R. MONCORGE',
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(Translated by A. Alt, M.D.)

The word "idiopathic" at once determines the object of this paper. I am not going to occupy myself with traumatic ciliary neuralgias or such as are caused by a foreign body, neither shall I speak of those chronic ciliary neuralgias which are due to alterations in the tissues (glaucoma, iritis, etc.), and which are symptomatic.

The idiopathic ciliary neuralgia is not a new affection. Old authors, especially Tavignot, have given it their study.† The recent ones, on the other hand, speak of it in a summary manner

*La clinique ophtalmologique, May, 1911.

†Tavignot, De la neuralgie ciliaire (Gazette méd. de Paris 1845 and 1848; Gaz. des Hop., Paris, 1860; Courrier méd., 1874. Desmarres, Traité des maladies des yeux, 1858).

or pass it over completely in silence. Does that mean that it is less frequent, less important? I, for one, consider it of great importance because it is very painful and very rebellious, at least the form which I have had occasion to observe, and it is more frequent than it is believed to be. Unfortunately the oculists ignore it, and I shall tell why this is so.

Aside from the subjective symptom of pain, the objective symptoms of idiopathic ciliary neuralgia are: swelling of the lid, conjunctivitis and blepharitis more or less severe, lacrimation, photophobia and spasm of the muscles in the neighborhood. Yet, in the form which I want to bring to the attention of the pathologists, which in my opinion by its clear and well defined character constitutes a true clinical entity too much ignored or too unknown, in this form there are none of the classical symptoms. There is neither conjunctivitis nor lacrimation, nor photophobia, etc. There is nothing but pain without any functional complication, and this pain, slight or acute, with irradiations which the patient neither cares to nor can localize. Thus he does not apply to a specialist but to the general practitioner on account of his headache. The practitioner having made an equally vague diagnosis of cephalalgia treats him accordingly. (In the case of one of my patients, 32 years of age, a hospital physician and professor of the Faculty made the diagnosis of "prolonged headache of the adolescents.") That is the way the ocular neuralgias of this type fail to come to the oculists.

The general character of the pain in this clinical form does not differ essentially from the painful phenomena in the common form. In the first stage, the palpebral form, there is a sensation of sand, dust and heaviness of the lids. In the second stage, there are stitches, flashes of pain, marked but still supportable pulling, a general contusion pain of the whole eyeball. Finally, there is a penetrating, vibrating pain, a feeling of tearing, punching, of a red hot iron being forced into the depth of the tissues.

Sometimes the spontaneous pain occupies the posterior pole of the eyeball and irradiates into the nose, sometimes the anterior pole and irradiates into the forehead. In both cases it may be combined with an infraorbital neuralgia. In other cases the pain is retro-ocular and irradiates into the back of the head and the neck. Most frequently it is situated on the outer side and is accompanied by vasomotor phenomena in the temporalis, more or less visible dilatation, or extreme constriction, so that the pulse can hardly be felt in this artery.

Thus the seat of this pain varies greatly. It may be stationary for a few days, on other days it may change several times in twenty-four hours.

It is almost always unilateral, but when it is severe it has a tendency to becoming bilateral. In about a dozen of cases which I have observed, the right eye was the sole or principal seat of the pain.

The progress of the affection is by crises which last from several days to several weeks with more or less violent outbreaks, sensation of intense burning, tearing, boring, and pulling which cause the patient to sigh deeply and even to cry out loud. Then the diffuse irradiations cause the formation of a perfect helmet of pain. In sum, we have the picture, with another location, of a facial neuralgia, the one like the other having in common that they are partial neuralgias of the fifth nerve. These paroxysms usually come on during daytime, but they may be nocturnal, and then sleep does not alleviate the pain. The patient is at once made aware of this by being aroused from his sleep, and when he arises in the morning the pain is still the same.

The pain increases on touch. Its seat can easily be outlined. Its extent varies between the point and the thickness of an ordinary pencil. But one must know how to look for it. The palpation of the eyeball shows often a slight increase in tension; yet this phenomenon is very inconstant as to one individual or another, or as to one crisis and another in the same patient. No visual trouble, normal reflexes to accommodation and light. The function, too, is normal; work, for instance, is only interfered with as it would be by a headache which renders brain work annoying.

When the crisis is past there still remains a remnant of pain as if the organ had been bruised. There is relative rest until a new crisis appears and with it new paroxysms.

One of the essential characteristics of this affection is its long duration. In one of my cases it began at the age of 14 years; he is now 47. In another it came on at 19 years; to-day he is 42. A lady has been suffering with it for 25 years, the ciliary neuralgia in her case having followed 5 years of classic migraine. In a general way men seem to be more predisposed to it than women.

Once acquainted with it the oculist or general practitioner can have no difficulty in diagnosing this form of ciliary neuralgia which, I repeat, on account of its general characteristics

should be looked upon as a clinical entity, just like facial neuralgia. It will not be confounded with the other orbital, infraorbital or supraorbital neuralgia because the central focus of the pain is the eyeball itself. It is distinguished from the ordinary migraine by the absence of periodicity and vomiting, and from ophthalmoplegic migraine by the absence of visual troubles and paretic symptoms. Once more, its main symptom is the pain.

What is the ætiology of the neuralgic affection? Here I must state that there are no functional troubles of the accommodation, no copiopia, nor purely local troubles. If in effect, I have seen it in myopes or astigmatics, whose defects were corrected, I have more frequently observed it in individuals with perfectly normal eyes. On the other hand, the paroxysm may come on in the night, during sleep, or may suddenly disappear while the patient is reading, during a functional exercise; in short, according to a capricious law, which we do not understand.

Like so many other neuralgias the ciliary neuralgia is the local expression of a general condition, and if on account of its seat it seems to appeal especially to the ophthalmologist, on account of its ætiology and pathogenesis it belongs to the general practitioner, who should take pains to get better acquainted with it. This is one of the cases, so numerous in local pathology, in which the specialist must be above all a good synthesist, a good physician. The patients suffering from this disease are hereditarily tainted with rheumatism and gout—in the ordinary clinical acceptance. They themselves have numerous personal arthritic antecedents. They are dyspeptics, have hæmorrhoids, suffer from entero-neuroses; they have different algies, as arthralgies, myalgies, etc. They are afflicted with the long continued autointoxication which for a certain modern school is the cause of arthritismus, and in autointoxicated individuals the ciliary neuralgia may be likened to the ordinary ciliary neuralgia due to malaria as described by Orłowski.* In one case the right sided ciliary neuralgia followed a leftsided intercostal neuralgia, which had lasted for 3 years without interruption and which promptly disappeared when the headache made its appearance. The same patient later on suffered from lumbago, sciatica, inflammatory attacks in different joints. Another had relief from his ocular trouble during the duration of an attack of mucomembranous entero-colitis.

The occasional causes are the same for the ciliary neuralgia

*Vratsch, St. Petersburg, 1900.

as for all other manifestations of "rheumatism." Especially at the change of the seasons the crises present themselves, and with the change of the weather the paroxysms appear; rain, snow, storms, etc.

What, furthermore, proves the constitutional nature of this affection is that there is a mental form of ciliary neuralgia. In such a case, the pain is not very sharp, it is more like a contusion pain, but accompanied by asthenia, mental torpor and need of sleep. A patient has given to me the following history: Whenever he gets up in the morning depressed, melancholic, blue without cause, disgusted with any cerebral effort, but without neuralgia, he is almost certain to have it come on near noon, or one o'clock. Then when the pain attacks the eye with sufficient severity, all the psychical phenomena disappear as by a charm.

Capricious in the localization and intensity of the pain, with the tenacity of the crisis, with its long almost illimitate duration, the ciliary neuralgia persecutes the patient whose existence it literally poisons. He belongs to it and is every moment its prisoner; it cuts short cerebral effort, the social relations even suffer from it. It is easily understood, therefore, that the patients arouse everything to get rid of such a horrible affliction. Unfortunately, it withstands almost all therapeutic measures. It is the rule that the classic remedies to alleviate the pain, antipyrin, aspirin, pyramidon, etc., fail to give relief. The salts of quinine recommended and acting well in the common forms, are of uncertain efficacy in this form. I have also seen to fail all calming collyria and certain remedies, as iodides, bromides and the bicarbonate of sodium. Only a general hygienic, hydrotherapeutic and dietetic treatment, seems to have a more fortunate effect, and even this is counteracted by obstacles and relapses which are unexplainable. One of my patients was for quite a long time submitted to applications of the continued current, applied to the sore spot, which were very painful. Even this was a failure. The only result was the small satisfaction of being able to measure in milliampères the intensity of the pain under the influence of various barometric changes.

Aside from this chronic form of the ciliary neuralgia, a true clinical entity, I have had occasion, frequently enough, to observe lighter, inconstant forms which lasted a few hours, a day, at the most two or three days. In all the cases the patients have only one complaint to make—the headache. We must, therefore, search for the site of the neuralgia. I have observed it in

women at the menstrual periods, then during the grippe, or associated with certain rheumatic attacks.

To sum up, the ciliary neuralgia, whatever its clinical form, occurs more frequently than is generally accepted. I am disposed to believe that it is the principal, if not the sole, cause of the ordinary, common headache of vague form and of which we have still to find the precise anatomical diagnosis, whether it is a neuralgia of one branch and whether there are associated neuralgias.

SOME INFLAMMATORY EYE CONDITIONS DUE TO ORAL SEPSIS.

Charles Goulden (*The Ophthalmoscope*, March, 1911) says that after all of the cases of chronic inflammatory eye affections due to such disease as syphilis, gonorrhœa, and diabetes (diseases that are known to be responsible for many cases of such eye trouble) are eliminated there still remains a large number of cases, especially of inflammation of the iris and ciliary body, that are due to some other cause or causes. He believes that many of these cases are caused by the absorption of germs or toxins from diseased teeth. Other foci of infection may also be responsible for some of these cases but he believes the trouble is most frequently found in the teeth. In a series of thirty-nine cases suffering with chronic inflammation of the uveal tract he found thirteen in which sepsis in connection with the teeth existed. Not all of the cases improved as rapidly as he wished after the teeth were removed, still in some of the cases the ocular disease improved so rapidly after the extraction of the diseased teeth that little room was left to doubt that this was the source of the trouble. He reports several such cases and sums up his remarks thus: "From an ophthalmic surgeon's point of view, we have in the mouth a source of infection which, in all probability, is at the root of much mischief that occurs in the eye. Although the number of cases enumerated is small, it is not on these cases alone that conviction rests, but upon a very great number of cases which have come under notice at different times, and which have all been treated on the supposition that the mouth was at fault, in many cases, with marked success."

MEDICAL SOCIETIES.

OPHTHALMIC SECTION OF THE ST. LOUIS MEDICAL SOCIETY.

Meeting of May 3rd, 1911.

Dr. M. H. Post in the Chair.

Treatment of Trachoma.—By Dr. F. P. Parker. (Abstract.)

In outlining the treatment for trachoma, we should not be content with examination of the diseased eye alone, but should thoroughly acquaint ourselves with the social and occupational surroundings of the patient, his habits, mode of living and individuality; in other words we should treat the patient as a whole.

Observation should include the location and limitation of the follicles, the contour of the lashes and lacrimal apparatus, and whether the disease has or has not previously been treated; also tuberculous and scrofulous conditions must be looked for, and the age of the patient considered, since the young respond more readily to treatment than do the old. The diet should be regulated, making it wholesome and nutritious, but not too stimulating. The great difficulty is encountered in prophylactic treatment because of the important social question involved.

Trachoma is essentially a disease of the poorer classes, the exceptions being principally sporadic, and flourishes in communities of unsanitary surroundings, and where there is ignorance and laxity regarding proper living conditions.

Here the services of the school teacher, clergy, and health department can combine most usefully with those of the physician in the work of education.

Patients so affected should be isolated if possible, or if this cannot be done, they should be provided with separate beds and individual towels. Running water should be used in preference to basins. The effectiveness of proper preventive measures is shown in the statistics of Trachoma in the Prussian Army, where the number of cases was reduced from 3,200 in 100,000 troops in 1867, to 110 cases in 100,000 troops in 1895.

The city of London has a Trachoma School where children affected with this disease are sent and given an opportunity to learn hygiene along with their other studies while under treatment.

Medicinal treatment can be applied in liquid or powder form, such as drops, douches, compresses, salves, and dusting powders. The drops most frequently employed are caustic, astringent and antiseptic. Not only should the dropper be thoroughly aseptic, but the hands of the physician, as well, and great care should be exercised that every part of the conjunctiva be reached by the medicament. Douching will be found of value in cleansing the conjunctiva from mucus and pus, and gives much comfort to the patient, an important point, where, as in this disease, long continued treatment is necessary. Great care should be used in not having the douche too strong.

The medicaments most frequently employed in the douche, are boracic acid, bichloride of mercury, and normal saline solution.

I have found 1 to 10,000 permanganate of potash solution very beneficial. Direct applications with the camel's hair brush and cotton applicators have their place; solution of silver nitrate often being used in this way. Considerable skill is required in its proper application since it is not only necessary to touch the palpebral conjunctiva, but the retro-tarsal folds, as well. It should never be permitted to come in contact with the cornea, but should be flushed with saline solution before restoring the lid to its normal position. Cold compresses are valuable in reducing swelling, congestion and irritation. In cases of pannus with secondary iritis, warm or hot applications are preferable. Boracic acid, lead, opium, chamomile, hops and tea leaves have all had their advocates in the form of compresses of various kinds.

Salves are generally introduced on the end of glass rods, into the lower conjunctival fold, the upper lid being pulled over and then well massaged. The salves may contain protargol, ichthyol, boracic acid, iodoform, xeroform, and copper sulphate, the base petroleum or lanoline.

The use of radium and the X-ray is of doubtful value. The surgical treatment of trachoma consists pre-eminently in the mechanical removal of the trachoma follicles, and may be accomplished by various methods. The ancients effected this purpose by means of scarifying the trachomatous lids with fig leaves. Later, this work was performed by using sharp pointed sticks, sharp curette, or the thumb nail. Some contend that each indi-

vidual follicle should be separately opened and expressed, though according to Fuchs, this is not practicable, since there are always small granules in process of development, which cannot readily be seen and thus escape. The squeezing out of the follicles by means of the Knapp roller forceps, or some of its modifications, seems to be the most popular of the surgical methods in use at the present time. The principal objection to this method is that generally too great pressure is used, and injury done the healthy membrane, thus encouraging scar formation. Excision of the retrotarsal fold is entirely unnecessary and may be productive of much harm. Tarsectomy is extolled by some for that stage of trachoma where scar formation has begun, or even considerably advanced, and with more or less persistent pannus existing. Galvano-cautery is a dangerous procedure, being difficult of regulation, and promoting scar formation. Electrolysis has not been enthusiastically received. The use of the wire or bristle brush involves too much danger to the conjunctiva. Of all the methods which have come under my observation, the one which has proven most efficacious, and productive of the least injury, when properly done, is the sand paper method of Coover. Number 0, or number 1 sandpaper is used, and it must be ascertained to be pure, since some contains an admixture of powdered glass. The paper is cut into strips $\frac{3}{4}$ inch wide by 3 or 4 inches long, and sterilized by dipping in alcohol and burning it off. Care must be used not to burn too long, since the sandy surface may be destroyed.

The patient to be under general anæsthesia, the conjunctival sacs thoroughly cleansed; the upper lid grasped with a Darier's forceps, is everted exposing the retrotarsal fold, a horn spatula protecting the cornea. The entire lid surface is to be thoroughly and briskly rubbed, but with barely the weight of the finger, which is sufficient to destroy the follicles. The surface of the lids after treatment, and the entire conjunctival sacs, are now thoroughly flushed with sterile water or normal saline solution, to wash away all the blood, and sand particles which may have become dislodged. Dry gauze compresses are applied and allowed to remain for 4 or 5 hours, after which ice compresses are applied from 24 to 48 hours, and then the use of Prince's copper solution for 4 or 5 weeks, by which time resolution has generally been completed.

Is Trachoma Increasing in America?—By Dr. Ernst Saxl.

I did not think it necessary or advisable to prepare a formal

paper, because the subject that I have before me is a perfectly open question. And I did not want to pass upon or view the question from my own experience, but I want to hear from all those present.

Is trachoma on the increase in America? My impression is that it is,—I mean trachoma in contra-distinction to the perfectly specific follicular conjunctivitis. I do not consider both as of the same type and character. Since our stringent immigration law, the people infected with trachoma are not admitted until they have been treated and cured of this infection. Some of them have gotten by the officials, by using adrenalin or similar products that will relieve the swelling and redness of the lid, and the immigration authorities were deceived. I have been in charge of the eye clinic of the central station of the City Dispensary, where quite a number of day-laborers from the railroad camps and crowded boarding houses are seen. Recently there were considerably more trachoma cases than were in the habit of coming, so that we saw in the clinic ten cases in ten weeks, that many cases coming under the observation of one man.

If the health authorities have no control of the laboring camps and crowded boarding houses I think trachoma is necessarily bound to spread. I had the opportunity of seeing, two years ago, a case that came from Ilasco, and I found not less than twelve cases that had become trachomatous within twelve months. Ten of these cases disappeared; as to what became of them, whether they came into the hands of some competent man who took steps to cure them or whether they spread the disease into the country, I do not know.

In the last epidemic in Belgium 4,000 soldiers were infected, but I do not think we will ever have an epidemic of that kind again. It is our duty now to look out for these cases so that there may be no danger of infecting others. I think when trachoma cases are seen they should be referred to the health department. The camps for infectious diseases near the Female Hospital could be utilized to keep these patients under observation. In this way we could keep them from spreading the disease. I do not know that I can add anything except that I would like to ask some of those that have large clinics to give us information as to whether they see more trachoma cases than formerly. I wish to state that of the number admitted to the Missouri School for the Blind, ten per cent. are due to trachoma.

The School Board is a help in this direction. They will not permit a child with inflammation of the eyes to return to school without a certificate from a competent oculist. This, however, refers only to cases that have been sent home to their parents by the physician making the rounds of the school.

People should not allow a child to return to school until this necessary formality has been complied with. I think the United States Government is not strict enough; there are few places where a regular examination of the troops is made. Eternal watchfulness is the price that we pay for safety.

The only way we can handle this problem is (1) to keep track of all of our cases of trachoma. (2) That we try to get from every physician who has a chance to see eye diseases, a report of the cases, and at the end of another five years, see whether the number of cases has increased or decreased. (3) The State and City Health Departments' attention should be called to the existing conditions of this disease and its highly contagious character.

DISCUSSION.

Dr. John Green, Jr.—I think that what Dr. Saxl has said is probably well founded. In Southern Illinois, Southern Missouri, and Northern Arkansas trachoma is epidemic.

Dr. Stucky, of Lexington, Kentucky, recently made a visit to the mountain regions of that State and found many of the poor whites infected; in some cases whole families had the disease, and their vision was impaired to such an extent that they could no longer read. And yet these people regarded this condition as "sore eyes" and of no seriousness.

During my term of service in the City Hospital, two patients came under my observation that were blind from trachoma.

I have been recently looking up the relation of immigration to trachoma. It appears that the immigration officials are thoroughly alive to the menace of this disease and have issued rigorous instructions to inspectors to exclude all immigrants with trachoma. At present I believe the Government regulations are sufficient to exclude all but a few immigrants with this disease. Some enter the country by way of Canada, where the officials are not so strict, as in this country.

Dr. Jennings.—It seems to me that from the increased number of physicians who are doing eye work all over the country, about 50 to 1, as compared with 20 years ago, that they ought

to be able to treat a great many more cases and keep the disease under control. In Missouri in the farming districts, many persons are suffering from trachoma. They are ignorant on sanitary matters and all wash in the same bucket and all wipe on the same dirty towel. It seems to me we should take some steps to educate the people on these matters. Trachoma is not contagious in the degree that some other diseases are, and this spread can be prevented if people will only use sanitary precautions.

Dr. Gross.—The question of the spread of trachoma has been studied by some men in Europe. In quite an extensive article in the *Zeitschrift fuer Augenheilkunde* which appeared within the last two years, the author states that the number of trachoma cases has increased. In the same article is a map in which he gives the relative frequency of trachoma as compared with what it was some ten years ago. He is thoroughly convinced that trachoma has spread very rapidly, and cases are becoming more numerous in Austria and that part of Europe. A large number of the cases, we see here, are among foreigners and people who come in contact with foreigners. In spite of the measures which the immigration officials take to keep them out, we see cases every day in the Washington University Clinic. Many of them do not know a word of English, and must recently have managed to escape the vigilance of the officials. Under these circumstances I do not see how we can keep trachoma from spreading here with these foreigners coming in with fresh cases. Nor do I see how the Government can do anything in regard to taking care of those who have this disease. The Government finds it difficult to take care of such a disease as tuberculosis, which is a very serious economic problem. I do not see how anything can be done except to educate the laity, and that is rather difficult, because so many of these patients are foreigners and people of the lower classes who come in contact with them.

Dr. Post.—In my private practice trachoma cases are very rare; latterly I have seen very few. One interesting thing I have noticed in my connection of twenty years with the Blind School, is that there are children in the institution who have trachoma, and children who are blind whose conjunctivæ are normal; and in all these years I have not seen any children contracting trachoma from those who have it. Of course precautions are taken, but in an institution where the children are blind, it must be difficult to carry out these precautions. But the pupils

do not seem to contract the disease and it has not spread in that institution.

The term "Blind Asylum" has been used; these are distinctly schools, not asylums. We used to have trouble in getting children into our Blind School, which was at one time designated as the Blind Asylum, and parents objected to sending their children to an asylum. We should do all we can to educate the laity as to the necessity of protecting their eyes against contagious diseases.

Among the educated classes this is pretty generally understood; we find almost all of them are awake to the danger of using the common towel or wash basin.

Trachoma is a danger to all of us. Some of the cases I have seen among people who would consider that they had been very careful, and would be much surprised at the suggestion of any neglect of care on their part.

Dr. Parker, closing.—In regard to the treatment with sandpaper, I have seen a number of cases treated this way and there was no scar formation; and while I do not know that it will cure all cases, I will say that if properly done, we have less scar formation than by any other method I have ever seen employed. I have seen 130 cases treated this way, and so far the results are very satisfactory.

J. G. CALHOUN, M.D.,
Section Editor.

ABSTRACTS FROM MEDICAL LITERATURE

By J. F. SHOEMAKER, M.D.,

ST. LOUIS, MO.

ÆTIOLOGY OF SCLERITIS, ITS TREATMENT AND RESULTS WITH TUBERCULIN.

Ervin Török (*Arch. of Oph.*, May, 1910) refers to statistics which show that scleritis occurs in from 0.44 per cent. to 0.28 per cent. of the patients in some of the large eye clinics. The views of different authorities as to the ætiology of the disease are given, the majority seeming to agree on rheumatism and gout as being among the leading causes. Others give syphilis, disturbed menstruation, and a few, tuberculosis. Török gives brief histories of fifteen cases of scleritis he has collected, and in most of whom he made diagnostic tests with T. V. and followed with T. R. treatment. He briefly sums up his cases and results as follows:

"I had under observation 3 male and 12 female patients, four of them were between 10 and 20 years of age, 6 between 20 and 30, and 5 between 30 and 50. The anamnesis shows tuberculosis in the family of 4 patients, in 2 the illness of one member of the family is suspicious of tuberculosis. In 9 cases the family history is negative. In five patients tuberculosis was present in some other part of the organism, but 10 did not show any evidences of the disease. The scleritis has in all cases been a chronic one, being present from 3 months to 4 years. In 13 cases we observe corneal complications, but in 2 the disease was confined to the sclera, one of them being an episcleritis. Six of the former 13 cases showed also iritis. I administered T. V. in 14 out of 15 cases; 12 of them gave us a positive reaction, 5 only general, 7 general and local. Two patients did not react to even 0.005 gr. T. V. The local reaction is noticeable in the increase of injection, photophobia, and pain, and in some cases in the development of new small nodules. In certain cases the conjunctiva also participated in the reaction; the eyelids became œdematous, the conjunctiva red, swollen and succulent, and discharged much muco-purulent secretion. The conjunctival involvement always disappeared without any treatment within a few days.

One patient, subject to acute articular rheumatism, and afflicted with episcleritis, did not want to submit herself to the tuberculin test; she showed improvement and later recovery under salicylate of soda. A relapse was observed four months later.

T. R. has been administered in 11 cases; in 10 I obtained a perfect cure, and the patients are without relapse from 8 months to 4 years. In one case the patient got only 11 T. R. injections, showed a great deal of improvement, and then interrupted our observations by not reporting at the clinic any more. In two cases where in spite of the negative result of the T. V. injection T. R. was administered, perfect recovery was obtained. Three patients, although the T. V. showed a positive reaction, did not submit themselves to the T. R. treatment.

Finally, I want to state that in my opinion, tuberculosis is the most important, most frequent, and probably the only ætiological factor in scleritis, chiefly in deep scleritis which is complicated with the involvement of the cornea, iris and ciliary body. Rheumatism may have something to do with episcleritis.

I think a typical gelatinous scleritis is never due to lues. Syphilis may produce in the tertiary stage a gumma of the sclera, or in the secondary stage a papule of the sclera. Both of them may resemble a true scleritis, but will never have the typical symptoms and course of it."

A CRITICAL STUDY OF THE OCULAR ASYMMETRY OF THE FORMOSAN SAVAGE.

Charles A. Oliver (*Trans. Am. Oph. Soc.*, 1910), from a critical study of a series of life-sized, full-faced and profile photographs of a large number of Formosan savages, which constituted a part of the ethnologic exhibit of the Formosan Government at the Louisiana Purchase Exposition, notes the following as some of the ocular characteristics of these people:

1. The skull formation, particularly among the Tsou grouping, was dolichocephalic in type and of good configuration.
2. The supra-orbital ridges were strongly marked, rather straight, and with a tendency for the right ridge to an upward and outward deviation.
3. The infra-orbital margins were well curved, properly shaped and more evenly situated than the supra-orbital.
4. The left eyeball was somewhat higher in the majority of instances.

5. The right eyeball was nearer the median line in the greater number of cases.
6. The left eyeball was, as a rule, more deeply set.
7. The corneæ were oval, their long axes which were directed about five degrees downwardly and inwardly from the vertical meridians, averaging about 10 to 11 mm. in length.
8. The pupils were oval, their long axes, which were 3 to 3½ mm. in length, being directed about three to five degrees downward and inward from the vertical meridians.
9. The interpupillary space averaged 61 to 63 mm. in length; the distance from the right pupil to the middle of the nasal bridge being the lesser on the right side.
10. The palpebral fissure was 8 mm. at its broadest portion, that of the right fissure being a trifle narrower.
11. The intercommissural distance equaled 33 to 35 mm., the lesser of the two portions from the inner commissures to the nasal median line being on the right side.
12. The commissural angles inclined some five to ten degrees down and in from the horizontal meridian.
13. The primary folds of the eyelids were well marked, though shallow.
14. The secondary folds of the eyelids were very slight and extremely faint.
15. The eyebrows, as a rule, were not pronounced, the supercilia, like the hairs of the scalp, being coarse and straight.
16. The cilia were abundant, well curved and properly formed.

COLOR VISION AND COLOR BLINDNESS.

F. W. Edridge-Green (*Lancet*, February 4 and 11, 1911), in his Hunterian Lectures, gives his theory of color vision and color blindness. He says:

A ray of light impinging on the retina liberates the visual purple from the rods and a photograph is formed. The rods are concerned only with the formation and distribution of the visual purple, not with the conveyance of light impulses to the brain. The ends of the cones are stimulated through the photochemical decomposition of the visual purple by light (very probably through the electricity which is produced), and a visual impulse is set up which is conveyed through the optic nerve fibres to the brain. The character of the stimulus differs according to the wave length of the light causing it. In the impulse itself we

have the physiological basis of the sensation of light, and in the quality of the impulse the physiological basis of the sensation of color. The impulse being conveyed along the optic nerve to the brain stimulates the visual centre, causing a sensation of light, and then passing on to the color perceiving centre causes a sensation of color. But though the impulses vary in character according to the wave length of the light causing them, the retinocerebral apparatus is not able to discriminate between the character of adjacent stimuli, not being sufficiently developed for the purpose. At most seven distinct colors are seen, while others see in proportion to the development of their color perceiving centres only six, five, four, three, or two. This causes color blindness just preceding total only the colors at the extremes of the normal six, putting colors together as alike which are seen by the normal sighted to be different. In the degree of color blindness just preceding total only the colors at the extremes of the spectrum are recognized as different, the remainder of the spectrum appearing gray. Though his own opinion is that the ordinary form of congenital color blindness is caused by a defective development of the portion of the brain whose function is the perception of color, we must not exclude any portion of the retinocerebral apparatus, defect of which would have exactly the same result. It will be noticed that the theory really consists of two parts, one concerned with the retina and the other with the whole retinocerebral apparatus.

He suggests the following points to be remembered in the examination for color blindness:

1. Most color blind make mistakes with certain colors, but are correct with regard to others.
2. The color blind name colors in accordance with their color perception, and thus show definitely to which class they belong.
3. Colors may be changed to the color blind while leaving them unaltered to the normal sighted.
4. The phenomena of simultaneous and successive contrast are much more marked for the color blind than for the normal sighted.
5. Many color blind match correctly but name the principal colors wrongly.
6. Many color blind recognize colors easily when they are close to them or the surface is large, but fail to distinguish between them when they are at a distance or the image on the retinal is small.
7. The color blind are more dependent upon luminosity than the normal sighted, and are liable to mistake a change in luminosity for a change of color.
8. The color blind find special difficulty with faint and dim colors.

9. The color blind who have shortening of the red end of the spectrum cannot see reds, reflecting or transmitting only rays corresponding to the shortened portion. 10. The color blind find more difficulty in comparing colors when different materials are used than when the colored objects are all of the same nature. 11. Most color blind find more difficulty with transmitted than with reflected light. 12. The color blind have a defective memory for colors. 13. Colors may be changed to the normal sighted while leaving them unchanged to the color blind. 14. The color blind may have a sense of luminosity similar to that of the normal sighted. 15. The dichromics distinguish between the colors of the normal sighted which are included in one of theirs by their relative luminosity and the difference of a saturation which is apparent to them.

The author mentions these tests: the lantern test, the classification test, the pocket test and the color spectrometer.

ACTION OF SALVARSAN ON THE EYE.

J. Igersheimer (*Münchener Med. Woch.*, Dec. 20, 1910) says that not only has salvarsan no injurious action on the eye, but in very many instances in his experience it had a curative action on syphilitic eye affections that were present. He says he has shown by his experiments on animals that the injurious action of atoxyl on the optic nerve is due to phenylarsenate, and that cats and dogs are particularly sensitive to it. There does not appear to be any phenylarsenate in salvarsan and in the animals tested with this drug no symptoms were noted which might suggest the toxic action of phenylarsenate. In the animals experimented on there was an accumulation of arsenic found as late as forty-eight hours after the last injection, but there was no March's reaction in the optic nerve. While this shows that an organic arsenic is not split off from salvarsan, it at the same time suggests the necessity for caution in the use of the drug. No tendency to hemorrhage in the kidneys, the specific sign of atoxyl poisoning, was present in the animals treated with salvarsan.